PHYSICAL GEOGRAPHY IN THE HIGH SCHOOL.

BY E. E. RAMSEY,
Bloomington, Ind.

INTRODUCTION.

Origin and purpose of the report. This report embodies the results obtained from two questionnaires, one of which was sent out by the teacher of physical geography in the Critic School of Indiana University and the other by Dr. J. W. Beede of the Department of Geology in the same institution. The first list was sent to teachers of Physical Geography in High Schools of the Middle West and the second to professors of geography and geology in the various normal schools, colleges, and universities of the United States, known to have courses in these subjects.

About 125 lists of questions of the first class and 26 lists of the second class were sent out. The total number of positive reports received from the high school questionnaire was 63; the total number of schools replying that they had no geography in their courses was 23, making a total of 86 schools reporting. Of the 23 schools having no geography, 18 were in Indiana. The number of schools reporting from Indiana was 52; this makes approximately 33 $\frac{1}{3}$ % of the schools of this state not offering the subject. The list of schools addressed embraces schools of practically every type and size, so that it is fair to assume that the results obtained are representative of average conditions in the Middle West.

From the schools to which lists of the second class were sent, 21 answers were received. Three lists were returned from normal schools, one list from colleges, and 17 lists from universities.

The answers indicate that much careful thought has been given in their preparation. They develop many points which are fundamental in the pedagogy of the subject. Although the answers are from widely different sources, there is a remarkable consensus of opinion upon many of them. The two questionnaires cover practically the same ground. The plan thus gives the secondary view and the university view of the subject. The writer believes that the questions sent out are questions that are fundamental in the teaching of geography, and hopes that the results obtained will unify, in some measure, the teaching of the subject. In the past, physical geography has been one of the "scrap heap" subjects—one to be taught by whatsoever teacher needed "one more subject" to complete his schedule. This condition has led

to bad teaching, and geography is yet—largely because of this condition of schedules—the least developed of the sciences of the high school.

HIGH SCHOOL LIST.

The following is a list of the questions sent to high schools:

1. School in which you are now teaching.
2. What subjects are you now teaching?
3. In what school did you receive your training?
4. What amount of time did you devote to physical geography and geology during your college course?
5. How long do you devote to physical geography in the high school?
6. In what year's work is physical geography taught?
7. What science or sciences follow it?
8. What science or sciences precede it?
9. Give your reasons for or against placing the subject in the year given.
10. What amount of time do you devote to recitation work?
11. Do you have laboratory work?
12. What amount of time is given to it?
13. State rather fully the nature of your laboratory work.
14. How much field work do you do?
15. State the plan of your field work.
16. What idea do you have in mind in doing field work?
17. Is your time for field work limited?
18. If so, how do you overcome this difficulty?
19. State the changes, if any, that you would recommend in recitation work, field work, and laboratory work in order to bring about better results in physical geography?
20. Do you teach the subject from the geocentric or from the anthropocentric viewpoint?
21. What amount of time in a nine months' term should be allotted to the following topics?

Mathematical Geography	
Weathering	
Rivers and river action	
Glaciers and glaciology	
Mountains	
Vulcanism	
Meteorology	
Plant Geography	

Animal Geography	
Geography of man	

NOTE. Answer the above question with the understanding that this distribution may be modified, if many peculiarly adaptable local forms are present.

22. State what you think the values of physical geography as a high school subject are.

23. Is physical geography as well adapted as a high school subject from the standpoint of subject-matter as the biological sciences, or as physics, or as chemistry?

24. To what extent do you use models, contour maps, and intricate apparatus in laboratory work and in demonstration work?

25. Do you use any elementary chemical and physical experiments for their bearing on physical geography?

26. Give a list of them.

27. How much work on meteorology do you do?

28. Does meteorology possess any advantages over other phases of physical geography as a high school subject? If so, what?

The following pages are devoted to the results obtained, together with discussion of these results.

Question 2. What subjects are you now teaching?

The purpose of this question was to determine in how far special teachers are employed in physical geography. As compared with conditions which obtained some years ago, the situation is much improved. In the 62 schools reporting on this question, 3 teachers had physical geography only; 40 had only science subjects (physical geography, zoölogy, botany, biology, physiology, commercial geography, geology, physics, chemistry), while 4 had in addition to geography taught one subject outside the science departments, 15 had combinations of geography, other sciences, and subjects outside of the science departments. This makes 43 schools—60% of the total—which have their teacher of physical geography employed in such lines of work that they tend to strengthen the teaching of the former subject.

The total number of subjects taught by the 62 teachers is 167. Of these 137 are science subjects.

Question 3. In what school did you receive your training?

Names of schools given in the various reports are purposely omitted. It is sufficient to say that the four schools the names of which appear oftenest in the lists of answers are schools whose courses in geology and physiography are recognized as

being of a *high standard*. Forty-two normals, colleges, and universities are named.

Question 4. What amount of time did you devote to physical geography and geology in colleges?

In reporting the results of this question, the system under which high schools are at present conducted rather than the teacher is believed to be at fault. It is certainly not expecting too much of school authorities to furnish a teaching force which is sufficient to care for the work without requiring a teacher to care for two, three or four unrelated subjects, or to assume responsibility of a subject in which they have had no training. The following table shows the amount of training:

4 years' work or more	3
3 years' work	2
2½ years' work	3
2 years' work	8
1½ years' work	4
1 year's work	22
1 semester's work	7
No work	12
No answer	3

There is no science, however, in which specific training may be dropped with less loss to the subject involved than in physiography, provided the teacher possess a broad knowledge of other sciences. But this should not be urged as an argument against better training of teachers in the field of geography.

Question 5. How long do you devote to geography in the high school?

Sixty-one schools reported on this question. Of this number 34 have a full year's course in the work and twenty-seven do the work in one semester. Quite a number of schools completing the physiography in one term take up commercial geography for the remainder of the year. By this means quite a few of the physiographic phases of the geography of plants, of animals and of man can be dwelt upon with sufficient length to partially compensate for the one semester's work in physiography. In the answers to a succeeding question, the question as to the position of the subject in the course, when one semester is given to it, is given. Thirteen of the 27 schools have the one-semester course in the freshman year. In the senior group, the work is evidently taken up from the synthetic standpoint, since but one of these schools has any science work following it. It is notice-

able that there is no school having a year's work in the senior year.

Question 6. In what year's work is physical geography placed?

The subject has a lead as a freshman subject. A significant contrast exists in the data for Indiana high schools and that for all other high schools from which answers were received. The following is a summary of the answers:

YEAR	Indiana H. S.	All Other H. S.	% for Indiana	% for Others	Total %
Freshman	15	21	23.8	33.4	57.2
Sophomore	7	6	11.1	9.5	20.6
Junior	4	1	6.3	1.6	7.9
Senior	6		9.5		9.5
Elective above Freshman	1	1	1.6	1.6	3.2
No answer	1	1	1.6		1.6
Total schools	34	29			

The Indiana high schools have the subject scattered through all the years of the course, although the number presenting the subject in the freshman year is greatest. Schools outside the state have the subject either in the freshman or sophomore years. The uniformity of position of the geography in the latter group of schools can only tend to give the subject more fixed and rational methods of treatment than is possible under the conditions found in Indiana high schools.

Question 7. What science or sciences precede it?

Ascertaining what science or sciences precede physical geography in the course is fundamental in selecting a method of teaching the subject. Physiography is not a fundamental science. The study of meteorology is largely a study of the chemistry and of the physics (particularly the latter) of the atmosphere. The study of zoogeography and of plant geography involves some general conceptions drawn from zoölogy and botany. The geography of man draws upon anthropology and ethnology, touches upon the history of the development of the various arts and crafts, traces the history of the material progress of the race, with its mental and institutional growth. Here alone is a contact with many lines of thought. It is practically impos-

sible to give a definite line of demarcation between geology and physiography. Theoretically, the definitions are sufficiently distinct that it would seem that no question of interpenetration of these two subjects could arise. But the practical condition of the subjects may be found by examining texts on physiography and geology written by the same author and noting the great amount of duplication, especially in the dynamic phases. The study of such topics as rocks and soils, weathering, rivers and river action are all quite largely physical and geological and chemical in character. It is essential either that the student have the various sciences in which the geography has its footing and thus approach the subject from the synthetic viewpoint or that he approach it from the analytic viewpoint, and in so doing be given the elements of the foundation sciences underlying geography. These two methods of treatment are so radically different that it seems to be vital to settle where in the course in geography each should come and then have the methodology of the subject conform to the accepted position. Of 61 schools reporting on this question 33 report physical geography as the first science offered in the course; of these 30 place it in freshman, 2 in sophomore, and 1 in junior work. Six other schools teaching it in the first half of the freshman year, thus making a total of 36 schools teaching it in the freshman year. Twenty-four of the 36 schools have a full year's course.

Six schools report full year courses in the sophomore year and seven have semester courses. Botany is the freshman science in eleven of these schools, physiology and zoölogy in the other two.

Three schools have full courses in the junior year, and two have semester courses. Six schools have semester courses in the senior year. Two schools report courses elective in any year above the freshman.

Question 8. What science or sciences follow physical geography?

The answers to this question furnish definite evidence of the trend of science work. It has been pointed out that 59% of the schools reporting place physical geography as the first science; further, that approximately 50% of them place it as the freshman science; the other 50% is divided among botany, zoölogy and physiology. The data secured shows that, from the 61 schools answering the question 17 of them placed zoölogy after geography, 27 placed botany after, 42 had chemistry fol-

lowing it and 52 had physics following it. Zoölogy and geography, 6 times; botany, 22 times; chemistry, 2 times; physics, 4 times.

GEOG.	Given Precedence Over	Geog. Not Given Precedence Over
Zool.	In 17 cases	In 6 cases
Bot.	In 27 cases	In 22 cases
Chem.	In 42 cases	In 2 cases
Phys.	In 52 cases	In 4 cases

Question 9. Give your reasons for or against placing the subject in the year given.

In answer to this question the arguments are brought out for the position which geography has in each school, but there is incidentally embodied a large amount of material which bears on the value of the science as a high school subject. What is given under this heading will therefore be partially repeated in the digest of the answers to question 22. The data and discussion are given by years. *Freshman year.* The first argument against its position as a freshman subject is, "It treats of applications of laws of physics, chemistry and biology and should therefore follow them." Admitting that the first part of the criticism is true, the last part does not necessarily follow. The points of contact between physiography and the sciences above mentioned can probably be given much more simply and just as interestingly earlier in the course. There are no fundamental laws of these sciences needed in physiography that a student cannot get and indeed *should not have* at a very much earlier period than they can be secured by waiting until the embodying sciences can be given. Moreover any one of these sciences is subject to the same fallacious argument. So many specialists argue that *their* subject should come last. If the geography be placed as a senior science another science more specialized in character must be substituted in the freshman year and the lack of scientific training and knowledge is again bemoaned. The second says, "It is difficult because it is so new; the students are unprepared for scientific methods." Of the five or six sciences offered in high school, which one will be any less new to the average class? Further, the question is not as to whether the child coming to high school is unprepared for scientific meth-

ods—he commonly is and undoubtedly normally so—but rather in what subject he can find this training best. “Pupils do not see the value of geography.” At the time at which this questionnaire was sent out, lists of questions were sent out to high school students. About 150 replies were received from them. The answers show that students of physical geography can and do see the value of the subject. “The freshman is not a close observer.” It takes a year of some science to make him a close observer. The character of observation in physiography is grosser is upon larger masses and quantities and is therefore better suited to the inception of methods of observation than other sciences. The question of weather observation, of stream action, does not involve such close scrutiny as does the sectioning of a leaf or the successful manipulation of a microscope. “The subject should be placed in the sophomore year, because the lack of concrete material necessitates a mature mind.” The sky and the clouds, the air and its moisture, the land and the sea, the mountains and the lakes, the plateaus and the rivers, the plants and the animals, and man himself are its concrete materials. “Should be in the junior year because it is not basal for the sciences.” There is probably no science so *nearly basal* for all the high school sciences as is geography. In the arguments for placing the subject in the freshman year, the belief that physiography is a foundation science predominates. Of 29 teachers who argue for this position of geography in the course, 14 mention its value as an introductory or as a foundation science. This combination of geography and introductory science can be made satisfactorily if the geographic elements are given the right of way and the elementary science, as such, left in the background. Much elementary science can be given in this way—quite as much as is usually given in courses purporting to be such. The elementary science will then have a skeleton upon which to support a body. If some of the works on elementary science *are* elementary science, then may we be delivered from the bondage of such work, and substitute something, anything, that has *continuity*. Five reports speak of the fact that physical geography normally belongs in the first year, because of its connection with grade geography. This seems to be proceeding from the known to the unknown in a perfectly logical way. Twelve speak of the fact that no science is so well suited to this stage of development of the student as is geography. This question of its adaptability is of course one of the

most fundamental of all questions with regard to its position. The fact that the subject is broad makes it especially adaptable to the young mind. Its subject matter is very concrete, although this argument may with validity be used with reference to the other sciences. The fact that there is an opportunity to observe the phenomena under more natural conditions than in other sciences contributes to the value of this science. This presupposes that some kind of field work—either class work in the field, the work of individual students in the field, or the observations of students previous to their study—is possible. Some one of these lines of observation work is undoubtedly feasible.

The subject creates an early interest in science and gives in general form the method of science study. The latter is true only when intelligent laboratory and field work are followed. It is also pointed out that the subject matter is common and that the nomenclature is neither difficult nor extensive. These two points when taken together are worth careful consideration. Certainly no phenomena are more common and there are comparatively few terms that are outside the average student's vocabulary. This minimizes the amount of definition work necessary. Many students quit the high school with the freshman year. Two answers say that because of this fact, the student taking physical geography during this year will quit school with a better knowledge of his larger environment than could have been obtained through the study of any other science.

Three other answers state that geography is basal for biology, commercial geography and history. Considerable emphasis is now placed upon ecology in the study of the biological sciences. The ecological contact is simply the contact with environment, of which the physical environment constitutes a larger part than the biological; consequently the value of the subject in the interpretation of botany and zoölogy, manufacturing, commerce and production are always conditioned by the same physical environment as life, to which may be added of course the contribution of natural resources. The study of geographic influences in history has recently had considerable attention paid it; enough to clearly warrant the above statement. Finally, the fact that easy laboratory and field work can be arranged is argument for placing the work in a position early in the course. Later on in this report the difficulty of field work is pointed out. This is an universal complaint in the sciences and is not peculiar to geography. The difficulties of field work in this subject are but

little, if any, more involved than are those relating to the same question in zoölogy and botany.

Sophomore year. In some schools geography is the first science offered, and is in the sophomore year. Quite a little of the argument therefore for placing geography in the freshman year is also given here. That it is a foundation science and that it connects with grade work are both given. Its contact with more students if given earlier in the course is mentioned. Lastly, the argument that the students are more mature is used. It seems that all such argument as this should be eliminated, because its logical and extended use would eliminate the subject from the high school course.

Junior year. One answer states that it can be made more scientific than in earlier years. Another school that has had geography in the junior year is now trying the subject in the freshman year with a view to placing it there permanently.

Senior year. One school having geography as a senior science argues against its position there by saying that it is less difficult than physics and that a student should receive some scientific training early in the course. Four schools argue for the work in this year by saying that the study of physics (3) and other sciences (1) render physical geography more intelligible.

Four schools do not attempt an answer, a few facetious answers are included, and a few are irrelevant.

Question 10. What amount of time do you devote to recitation?

Sixty-one lists answer the question, ten in terms of hours per week.¹ The other answers have been reduced to this basis as nearly as possible.

- (1) Five hours per week. 26.
- (2) Four hours per week. 8.
- (3) Three hours per week. 13.
- (4) Two and one half hours per week. 6.
- (5) Two hours per week. 3.
- (6) Two thirds of time. 2.
- (7) Nine tenths of time. 1.
- (8) Three fourths of time. 1.
- (9) No answer. 3.

Question 11. Do you have laboratory work? Question 12. What amount of time is given to laboratory work?

¹Hereafter, when numbers in parenthesis appear in the body of a sentence or at the end, they indicate the number of answers credited to the particular point in which the number is found.

Forty-three schools report laboratory work in varying amounts; 16 report no laboratory work, and 4 do not answer. It is fair to assume that these four do not have laboratory work, thus making a total of 20. Every school that has fewer than five recitations per week has laboratory work. From the 26 schools having 5 periods of recitation per week, 16 have no laboratory work, one does not answer, and 9 have some laboratory. Two of these spend one-half period per week; two one period per week; three two periods per week; and one four periods per week.

The average time spent by all schools in laboratory work is somewhat less than 2 periods per week.

No school states that double period time is allowed them for physical geography work. The interpretation of this fact is that this science is not placed on an equal footing with other sciences.

Question 13. State rather fully the nature of your laboratory work.

Because of the fact that not all schools have laboratory work there were but 46 schools reporting. The suggestions as to the nature of the laboratory show considerable uniformity in the selection of material. Twenty-two schools base some of their laboratory work upon contour maps. Seven others mention a rather widely used manual of geography, which contains much work in contour maps. This makes a total of 29 schools using such materials. Twenty-two use "rocks, minerals and soils" as a basis for laboratory work. Twelve of these schools mention the study of rocks and minerals. It is highly probable that this line of work can easily be overdone without securing results which will be of vital importance to physiography. Too much energy and time will be given to them for their own sake. The making of weather maps and the keeping of weather records is mentioned by 25 schools. Under the same general heading of meteorology, three mention studies of the atmosphere. Rainfall charts and maps, winds, forecasts, isothermal maps, graphs of thermometric, barometric and rainfall conditions are suggested.

(To be Continued.)